



Designation: D2881 – 19

# Standard Classification for Metalworking Fluids and Related Materials<sup>1</sup>

This standard is issued under the fixed designation D2881; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This classification covers and is designed to standardize and consolidate the terminology, nomenclature, and classification of metalworking fluids and related materials.

1.2 Metalworking fluids includes both metal removal and forming fluids. These are the coolants and lubricants associated with both types of processes.

1.3 This classification implies no evaluation of product quality or suitability for a given metalworking operation.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants](#)

[E2523 Terminology for Metalworking Fluids and Operations](#)

## 3. Terminology

3.1 For definition of terms used in this test method, refer to Terminologies [D4175](#) and [E2523](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *amorphous, adj*—possessing neither a lattice nor crystalline arrangement of atoms.

<sup>1</sup> This classification is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.L0.01 on Metal Removal Fluids and Lubricants.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.2.2 *crystalline, adj*—possessing a lattice or crystalline structure; that is, a definite arrangement or pattern of atoms in space.

3.2.3 *emulsifier, n*—a surface-active agent, or surfactant, that is at least partially soluble in both liquids (phases) of an emulsion, and thus stabilizes one in the other.

3.2.4 *emulsion, n*—a relatively stable mixture of two immiscible liquids, one of which is held in suspension in the other by small amounts of emulsifiers.

3.2.5 *functional additive, n—in metalworking fluids*, a chemical substance formulated into a metalworking fluid to provide one or more specific performance properties not inherently provided by the basestock.

3.2.5.1 *Discussion*—Functional additives include, but are not limited to, antifoaming agents, antimicrobial pesticides, buffers, corrosion inhibitors, coupling agents, emulsifiers, lubricity additives, and metal deactivators. The number and range of functional additives varies with the metalworking fluid formulation, and can range from a single additive to numerous additives in order to provide the performance properties specified by the fluid compounder.

3.2.6 *micelle, n*—a colloidal aggregate of surfactant molecules that occurs at a well-defined concentration.

3.2.7 *petroleum oil, n*—a naturally occurring hydrocarbon mix that was initially formed under pressure in the earth's crust and is liquid at room temperature.

3.2.8 *straight oil, n—in metalworking fluids*, an oil, petroleum or synthetic, which essentially contains no water and is neither emulsifiable nor miscible in water.

3.2.9 *synthetic fluid, n*—a non-petroleum liquid that possesses lubricating properties. It includes both man-made and naturally occurring liquids.

3.2.10 *vitreous, adj*—having the appearance and properties of a glass; that is, a hard, amorphous, brittle structure.

## 4. Significance and Use

4.1 Metalworking may be divided into two general types of processes, metal deformation (such as rolling) and metal removal (such as grinding or cutting). This classification lists the various types of fluid and non-fluid materials used to directly provide cooling and lubrication in both types of metalworking processes. It is intended for use by those in

\*A Summary of Changes section appears at the end of this standard